



## SHOULDER-BELT-PORITION GUIDING ASSEMBLY

### CROSS REFERENCE TO RELATED APPLICATIONS

This is a divisional application of the US-serial number 09/554,463 related to an international application number PCT/DE98/03270 (WO 99/24294, European Patent EP 1 037 773 B1, German Patent DE 197 49 780 C2) filed Nov. 10, 1998.

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention:

10 It is an object of the present invention to enhance the comfort of belt users of a transport system (motor vehicle, ship, train or aeroplane) and the survival chance in the event of any accident (front-, side-, rear-end collision and/or rollover or pile up/mass collision) or during in-flight turbulence.

#### 2. Discussion of the Prior Art:

15 It is known in the prior art to provide for a passenger of the transport system a seat belt, equipped with a shoulder-belt-portion guiding deflector with fixed height or a seat-belt-turning mechanism with fixed height to prevent neck injury.

Under constraint of great deformation of the post section, in which an extending belt portion of the seat belt, equipped with a belt retractor 13, having a clamping device, is arranged (Fig. 1), the shoulder belt portion, loosely guided by a conventional height-adjustable D-ring 12, attached to the post sections (pillars, pillar portions), or strangulates the neck of the belted passenger and/or injures the aorta of his neck in real-world side-crashes, causing instant death.

25 Passenger, wanting to use the seat belt 1, must make an effort to grasp the main latch plate 9, when in resting position behind the seat backrest 3.2.

Ref. to US No. 5,570,933 both the shoulder belt portion of the three-point seat belt, loosely guided by the shoulder-belt-portion guiding deflector with fixed height, fixed to the seat backrest on the top and side edges, and the lap belt portion are attached to the post section. This shoulder-belt-portion guiding deflector with fixed height is uncomfortable for a passenger of extreme body proportion, when using the seat belt.

US 5,599,070 teaches a seat-belt-turning mechanism, fixed to the seat backrest on the top edge and comprising eight parts, one of which is a turning member, by which the shoulder belt portion 1.2 is guided and turned into an extending belt portion 1.4, which is guided by a sheath and connected to a belt retractor, fixed to a frame of the seat backrest. The height-adjustable, one-piece belt deflector 5, 5a, 5b (Figs. 1 to 3) is far cheaper and more effective than that seat-belt-turning mechanism with fixed height.

Passengers with a height of less than 1.5 m or more than 2 m feel uncomfortable, wearing seat belts, due to the limitation of the height-adjustment of the D-rings 12 or the fixed height of the seat-belt-turning mechanisms or shoulder-belt-portion guiding deflectors.

## SUMMARY OF THE INVENTION

Accordingly, the principle object of the present invention is to provide for passengers of a transport system shoulder-belt-portion guiding assemblies which increase convenience, comfort and survival chance in the event of an accident or during in-flight turbulence, resolve the above-mentioned shortcomings and are suited for three-point to multi-point seat belts.

A second object of the present invention resides in a cost-, space-saving integration of a height-adjustable shoulder-belt-portion guiding deflector, a head rest and the shoulder-belt-portion of a three- or multi-point seat belt into the shoulder-belt-portion guiding assembly.

## INDUSTRIAL APPLICABILITY

It should be apparent that the invention provides substantially more convenience and greater survival chance including the following features:

- a) Use of the height-adjustable shoulder-belt-portion guiding deflector 5b (Fig. 3) or of the shoulder belt deflector 5 (Fig. 1), each upper portion of which is projected through the top edge of the seat backrest, makes the conventional height-adjustable D-ring 12, attached to the B-, C-, D-post section, shown in Fig. 1, unnecessary.
- b) In another embodiment the shoulder-belt-portion guiding deflector 5a (Fig. 2) can be rigidly attached to the head rest 3.6a as well as to one of the head-rest tubes 5.10 or the shoulder-belt-portion guiding deflector 5b if replacing the aperture 5.9.
- c) Any adjustment of the height of the head rest 3.6a to the head automatically adjusts the height of the shoulder-belt-portion guiding deflector to the shoulder. This feature differs

from the D-ring ref. to DE 40 10 452 A1, which is in contact with the shoulder belt, when the passenger is thrown forward, and is moved up to intercept the head, when the passenger is thrown backward. If the belt deflector 5 is not height-adjustable but movable, it can be connected to vibration-dampening energy absorbers, ref. to US-serial number  
5 09/554,464 (EP 1 037 771 B1, DE 197 58 478 C2, CA pending patent 2,347,040), which absorb energy and dampen vibration when the shoulder belt portion moves it up.

d) The tragedy, linked to neck-strangulation, above-mentioned, is, to a great extent, averted by the shoulder-belt-portion guiding deflector in conjunction with a feature of arranging the extending belt portion and the belt retractor in the seat backrest and arranging the belt end  
10 of the lap belt to the seat frame.

e) For the convenience of the passenger, when stepping out, the shoulder-belt-portion guiding deflector intercepts and loosely retains the released main latch plate 9, which is loosely held by a main-latch-plate adaptor (not drawn) fastened to the lap belt portion. He or another passenger, when taking the seat and wanting to use the seat belt, easily accesses the  
15 released main latch plate on the shoulder-belt-portion guiding deflector. See an alternative feature for easy access thereof, undermentioned.

### BRIEF DESCRIPTION OF THE DRAWINGS

A number of embodiments, other advantages and features of the present invention will be  
20 described in the accompanying drawings with reference to the xyz global coordinate system:

**Fig. 1** is a perspective view of a seat with buckle assemblies attached to the seat backrest and seat cushion as well as of a 1st embodiment of a height-adjustable shoulder-belt-portion guiding deflector 5 and a three- or multi-point seat belt 1, having a main latch plate 9, which, when the seat belt is used, is inserted and plug-in connected to a main buckle  
25 assembly 9.1

**Fig. 2** is a perspective view of a 2nd embodiment of a shoulder belt deflector 5a on a head rest having a pair of head-rest tubes 5.10.

**Fig. 3** is a perspective view of a 3rd embodiment of a height-adjustable belt deflector 5b having a locking handle 5.2.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

The advantages of the preferred embodiments in the Chap. "INDUSTRIAL APPLICABILITY" are outlined hereinafter with regard to the functions and features thereof.

5 A three-point seat belt consists of a shoulder-, lap- and extending belt portion. A multi-point seat belt 1 consists of a first and second shoulder belt portion 1.1, 1.2, a lap belt portion 1.3 and an extending belt portion 1.4 (Fig. 1).

10 In the 1st to 3rd embodiment the passenger can unlock a locking member of a locking handle 5.2 to adjust the height of „ $\Delta h$ ” of the shoulder-belt-portion guiding deflector 5b, provided with a belt-guiding member, which is an aperture 5.9, by which the shoulder belt portion 1.2 is loosely guided. Finally, the shoulder-belt-portion guiding deflector 5b at the appropriate height is locked by that locking member. Owing to the features of being guided by a member of a seat-backrest frame, locked therein, movable therealong and nonrotating about a longitudinal axis thereof the shoulder-belt-portion guiding deflector 5, 5b can further be  
15 exploited as a single head-rest tube, fastened to any head rest, such as 3.6a. Conventional head rest has a pair of stiff head-rest tubes 5.10 (Fig. 2), moveable along members of the seat-backrest frame, guided thereby and locked therein. Alternatively, the shoulder-belt-portion guiding deflector 5a (Fig. 2), serving as a belt-guiding member, can be attached either to the head rest 3.6a or to the head-rest tube 5.10 or to the upper portion of the shoulder-belt-  
20 portion guiding deflector 5a.

When a head rest of fixed height (Fig. 3) is integrated into the seat of, for example, a Volvo, a Ferrari or a Porsche, a space-saving, height-adjustable shoulder-belt-portion guiding deflector 5b can always be installed in either side (free region) 3.22 of the seat backrest 3.2.

25 When the height-adjustable head rest is adjusted to the height of a head of any passenger, the shoulder-belt-portion guiding deflector with the shoulder belt portion adapts itself to his body proportion.

30 As the alternative feature for easy access of the released main latch plate 9, it, loosely retained by a main-latch-plate adaptor (not drawn) fastened to the lap belt portion, is positioned in resting position at the height of, for example, the elbow of the sitting passenger when the belt retractor 13 retracts the shoulder belt portion through the shoulder-belt-portion guiding deflector. The main-latch-plate adaptor can be a snap-in clip, which, made of a plastic

material, consists of two pieces, a stud of one of which is inserted through the lap belt portion and into an opening of the other and snap-in engaged therewith, as known in the art.

Although the present invention has been described and illustrated in detail, it is clearly understood that the terminology used is intended to describe rather than limit. Many more  
5 objects, embodiments, features and variations of the present invention are possible in light of the above-mentioned teachings. Therefore, within the spirit and scope of the appended claims, the present invention may be practised otherwise than as specifically described and illustrated.